“Block” and “run” innovative strategies and their implications for project and knowledge management routines:
The case of a pharmaceutical and chemical company

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Abstract

The role of innovation in business has long been recognized, but increased competition among companies has forced them to seek new strategies. In this paper, two types of strategies will be compared. In the first type, patents play a key role in protecting businesses from the entry of new competitors (block). The second strategy is characterized by repeated introduction of new products on the market (run). The focus of this article will be on the implications of these strategies for the firm and its internal procedures. Specifically, we investigate how the choice of innovative strategy determines the type of project management and knowledge management that the company adopts.

Based on a case from the chemical and pharmaceutical industry, we will demonstrate that both types of strategy involve “heavyweight project management.” In the block strategy, learning processes are mainly dedicated to scientific knowledge rather than market knowledge. Consequently, development partnerships are established primarily with academic units and research centers of other companies. In contrast, in the run strategy, repeated interactions with customers occur during the development process. This “learn and probe” process is aimed at iteratively defining the new product with the customers. Development partnerships involve the clients themselves and enable joint learning.

Because very successful companies have recently combined these two types of strategies, we will elaborate on the implications of such a dual strategy for the company. As each strategy alone is associated with a specific knowledge management approach, internal conflicts might emerge when they are combined. We will conclude with organizational procedures that might reduce such conflicts.

Résumé

L’importance de l’innovation dans la concurrence entre firmes, depuis longtemps soulignée, n’a fait que s’accroître ces dernières années. Les firmes ont été amenées à développer des stratégies d’innovation de plus en plus variées. Nous caractérisons deux stratégies typiques qui peuvent également être combinées. La première est une stratégie de blocage des concurrents par l’innovation ; la seconde est une stratégie de course à l’innovation. Le texte s’intéresse aux conséquences de ces deux stratégies sur l’organisation interne de l’entreprise. Quel type de management de projet et de management des connaissances impliquent-elles ? L’analyse est développée à partir du cas d’une grande entreprise chimique et pharmaceutique.

Nous discutons également les implications d’une stratégie double, associant protections par brevets et course à l’innovation produit. Compte tenu des conflits

internes associés à une telle combinaison quelles solutions organisationnelles seraient de nature à les réduire ?

In recent years, innovation has become increasingly important in defining business strategies. Although innovation has always been a factor in the growth and competitiveness of a company, various innovative strategies have emerged in response to the rapid changes in the economic environment.

Traditionally, innovative products dominated the market for long periods of time. In the chemical and pharmaceutical industry, for example, aspirin, an analgesic drug, dominated the market for decades without the threat of any similar product. Such was also the case for nylon and other types of polyester. For these innovations, patents guaranteed that the company would not be imitated for a certain period of time and would get to keep the benefits of the investment for itself. Generally, patents serve as an incentive for companies to develop new scientific knowledge, new products and processes.

Although patents build strong barriers against new entrants, business history has repeatedly shown that the technical advance of a company is temporary. First of all, new competitors take the opportunity of technical breakthroughs to take a dominant position. Such has been the case, for example, in the photographic industry with the evolution from chemical film to digital format. Then, other competitors develop generic products when patents have expired taking a large portion of the market share because of cost advantage. In the pharmaceutical industry, government agencies encourage such a strategy in order to lower the price of drugs for which patents have come to an end. In the food industry, generic products have also developed as a result of the growing power of discount department stores.

The period during which a company can count on a competitive advantage related to an innovative product has increasingly become shorter. Consequently, companies have sought innovative strategies to extend their competitive advantage over a longer period of time. One innovative strategy consists of repeatedly introducing new products. At such a high pace, the company reestablishes its competitive advantage recurrently. This race to innovation race also provides a solution to the decrease in demand that results from the saturation of markets once diversified and renewed products are offered. But companies adopting such a strategy need to shorten their development cycle and reduce their costs. As new product life cycle become shorter, development costs have to be reimbursed over a shorter period and over smaller sales. Development lengths are generally directly related to their cost.

A second innovative strategy focuses on reinforcing barriers to entry in order to contain competition. The protection of the core innovation is reestablished by adding complementary innovations, either in the process or with related products, which can be patented. Not surprisingly, the propensity of firms to patent has increased.

Although these two strategies—one consisting of running from one new product to the next (*run*) and the other of blocking new entrants (*block*)—stand in opposition to each other, firms increasingly tend to combine them. For example, companies in the specialty chemicals industry introduce new products at a high pace and have a high propensity to patent. The phenomenon is similar in the computer industry, where products quickly become obsolete and intellectual property is carefully studied. This trend also exists in less technological sectors such as cosmetics (L'Oreal) or appliances (Tefal).

The purpose of this article is to analyze the implications of each of these strategies (*block* and *run*) for the internal organization of the firm. What kind of organizational processes actually support the repeated introduction of innovations on the market? Are they similar to the processes that enable the company to develop innovations protected by long-term patents? To be sure, project management and project portfolio management arelikely to be key issues in the run strategy. Short development time is required to repeatedly introduce new products. In contrast, project management appears secondary for the block strategy where filing for patents is the key issue. Management of highly skilled workers and the organization of research centers are the main concern. Does the empirical analysis of companies exemplifying one of these strategies confirm these trends? How do firms manage to combine these two strategies if their internal consequences profoundly differ?

We will first elaborate on the implications of these strategies on internal processes of project management and experts management that we might expect based on the literature. Then the case of a large chemical and pharmaceutical company will be analyzed. The chemical branch of the company will enable us to discuss the implication of the run strategy on the internal organization. This branch commercializes diversified specialty chemical products frequently renewed in order to cope with customer needs and competition. In contrast, the pharmaceutical branch exemplifies the block strategy. After having discussed these two strategies separately, we will investigate how a company might combine them. What are the organizational conditions associated to a dual strategy? What tensions are likely to be encountered?

I – Organizational processes and innovation strategies in the literature

According to the literature, the organizational processes associated with innovative strategies are the **project management methods** and the **knowledge management routines** (Ben Mahmoud Jouini & Midler, 1998, Weil 1999, Robinson & Chang 2002).

Project management

Over the past twenty years, new product development has been widely analysed. One project management model—the "heavyweight project management" model—stands as a synthesis of numerous works on this subject. Its efficiency, as measured by development lead time, has been demonstrated in a variety of industries. Consequently, most firms have tried to implement this project mangement model ever since.

Based on the research of K. Clark & T. Fujimoto (1991), M. Cusumano & K. Nobeoka (1992) and C. Midler (1993), project management methods are characterized along the following dimensions: the project manager position (1), multi-expertise teams (2), overlapping phases and concurrent engineering (3), "learn and probe" process (4) and development partnerships (5).

Project manager position. In the "heavyweight" project management model, projects are coordinated by a project manager who has enough status in the company to affect the basic direction of the project (i.e., to revise the target and switch outside partners).

The project manager also works the project full-time and without interruption until it is completed.

M*ulti-expertise teams*. The geographical proximity of the individuals involved in the project, at best collocated on project floors, is a first attribute of a multi-expertise team. Regular, frequent, and open-ended meetings which focus on choosing options and drafting working plans and are not just dedicated to reporting is a second. Third, these project teams bring together different functional specialties. To assess the multifuntional character of the team, the typical functions of the firm are considered (R&D, engineering, production, and marketing). These typical functions in the industry studied translate into: product development, process development, customer approval of the product and start-up of production installations.

Concurrent engineering. This characteristic of project management is assessed according to the overlaps in typical project phases: concept definition, preliminary study, detailed product and process design and production trials. Here again, the major phases are adapted to the industry studied.

Project management will be deemed “heavyweight” when it has these three characteristics: high status of the project manager, multi-expertise team and concurent engineering.

Learn and probe process. The involvement of selected customers in iteratively testing new products has been related to successful innovation by several authors (Ackrich, Callon & Latour 1988, Iansiti & Clark 1994, Lynn, Moronne and Paulson 1996, Tabrizi and Eisenhardt 1995). It has been studied most specifically in the case of breakthrough innovation. But understanding what customers see as a source of value is critical even if innovation is more incremental, as it is often the case in the run strategy. The customer relationships will be analysed in focusing on the role the customers have in testing product prototypes or first versions during the development process.

Development partnerships. Since the design of new products involves not only one company but also other organizations, the network of organizations in which the innovation process takes place is a key concern. The type of relationship established with other players in the network has an impact on the performance of the innovation process. Partnerships with suppliers responsible for the development of subassembly during the design process relates to improved efficiency, as shown in studies in the auto industry. The players involved in development partnerships (customers, suppliers, university research centres, competitors, distribution industry etc.) will be listed to characterize the project management on this dimension.

Knowledge management.

In addition to work emphasizing the role of project management in the efficiency of new product development, research studies have recently stressed the importance of the learning processes that take place between experts and within project teams and, more broadly, knowledge management routines. The development of the new competencies that will be needed because of the evolution of technologies is a primary issue (Teece 1998, McEvily & Chakravarthy 2002). Recording and maintaining know-how which have contributed to past technological success are also important. Tacit, situated and embodied knowledge forms the main body of organizational knowledge that raises the issue of how to identify, share and memorize this knowledge in the firm. Knowledge management routines will be analyzed in differenciating two levels.

Individual incentives. The incentives for individuals to develop new knowledge is the first focus. Following with the studies of Cockburn & Henderson (1998), existing corporate measures to promote scientific production and foster professional networks (communication at symposia, the publication of articles, patents) will be identified. This emphasis on the individual level is consistent with Mintzberg's professional bureaucratie model, in which competencies are held by individual professionals.

Collective learning processes. The organizational devices designed to promote learning among groups are also critical to knowlege development. Following Allen's work on interpersonal communication and Nonaka (1994) and Weil (2000) results, formal methods for sharing the competencies gained by one expert in the course of working on a project with a group of experts (workshops, newsletters, clubs) or for building new knowledge on a team base will be analysed.

Which project management method and knowledge management routines better fit with each of the strategies oulined at the beginning of the article? Based on our literature review, what might we predict?

Based on Afuah's definitions (1998), *block strategy* will be used to refer to the innovative strategy of a firm that attempts to erect barriers to entry in order to protect the market position taken by an innovation. For example, some firms create barriers by focusing on hard-to-imitate competencies and assets, while others establish intellectual property rights.

In contrast, in the *run strategy*, the company would regularly modify specific components of its products or their integration so as to offer customers additional value. The rationale of such a strategy would be that barriers to entry associated with an innovation are temporary and can be circumvented. Thus, sustainable profitability relies on the continuous and rapid renewal of products (Benghozi, Charue-Duboc & Midler 2000, Weil & Hatchuel 1999). This process of repeated innovation reccurently gives the company an edge over the competition. The company needs to be able to rapidly develop new products. The company also needs to possess market knowledge: who are the customers, how do they use the products, what properties are the most valuable? Implementing this strategy requires internal organizational capabilities that will be stated as hypotheses. The hypotheses are based on the literature and tested with the case in the chemical and pharmaceutical industry.

The first hypothesis relates the run strategy to the heavyweight project management model (H1). Several works have shown a correlation between this project management model and a reduction of the development cycle time which is a key factor in the efficiency of this strategy. Second, a "learn and probe" process is expected to be part of the project management (H2). Though this concept has been developed for radical innovation, this iterative process, allowing many interactions with future customers while the new product is elaborated, shall be adopted in firms having a run strategy. The run strategy relies on the ability of the firm to cope rapidly with the evolution of the market. "Learn and probe" processes enable the project teams to adapt the product to customer needs and enhance market knowledge. Our third hypothesis relates to knowledge management. The run strategy should be associated with a focus on collective learning processes and organizational artifacts dedicated to fostering them should be implemented (H3). As stated earlier, run strategies are adopted based on the assumption that a competitive advantage relating to an innovation is only temporary that products get quickly imitated that patents will be circumvented. Such is often the case when technical and scientific knowledge mobilized is mature. Completing the development of a new product then implies that the project team to address and overcome specific issues. Collective learning processes more than sharp expert's knowledge are critical for such problem solving (Nonaka 1994).

As for the run strategy, the block strategy rests on organizational capabilities that will be emphasized. The differentiating characteristics of the product, its usage, its cost, or its production process determine the profitability of the innovation for the firm. The profit is generated by the innovation as long as no other company manufactures and commercializes a similar product at the same price. The possibility of patenting and the difficulty in imitating or in overturning the patent are the key factors that ensure the durability of profit (Teece 1986). Thus, the issue is not so much the introduction of a new product on the market but the filing for a patent and the primacy. The heavyweight project management model would not be appropriate in this situation. Concurrent engineering may even slow down the patenting process as the work necessary to file for a patent takes place during the early phases. In contrast, a sequential pattern of development may allow focusing on early development phases. As a result, filing for a patent might be accelerated. The secrecy on important findings might also be more easily protected this way. Thus, the block strategy should not be related to heavyweight project management (H4).

In addition, this strategy is more likely to be adopted in industry relying on scientific disciplines experiencing a rapid development. In such a context, relationships with academic units are critical to rapidly absorb and take advantage of the latest developments and establish intellectual property rights. Development partnerships with academic units are expected (H5). The discovery phases of projects are crucial because they establish the basis of any patent application. Scientific expertise and the elaboration of new knowledge on the product determines the efficiency of these phases. The experts of the company, specialized, highly skilled and recognized in the scientific community, are the one whose input is critical. Thus, managing human resources, especially experts—enhancing their creativity and supporting them in developing professional networks—are the priority. Knowledge management will emphasize individual learning processes (H6). The incentives to publish and patent will thefore be dedicated to these experts.

dimensions	Run strategy	Block strategy
Project mgt heavyweight	H1 +	H4 -
Learn and probe	H2 +	No prevision
Dvt partnerships	No prevision	H5 +
Knowledge mgt Individual incentives	 H3 bis -	 H6 +
Collective processes	H3 +	H6 bis -

+ stands for a positive relationship ; -- stands for a negative relationship

II – Method

We will consider the case of a major french chemical group which has been undergoing a strategic reorientation and a thouroughgoing review of its project management procedures since 1992.

The pharmaceutical branch provides a typical example of block strategies; indeed, patents play an extremely important role in the drug industry, not only in protecting revenues while development costs are very high but also in securing marketing authorizations. The newness of active ingredients and of their therapeutic effects is often a prerequisite. This provides a way for regulatory agencies to orient firms' strategies.

The chemical branch, which has shifted its focus to specialty products, is typical of the run strategy. Indeed, although innovations generate applications for patents, new products are also being introduced at a fast pace. In the chemical industry, often different products may have similar use property and the patent is only on the specific prodcut developed it doesn't block new entrants with a slightly different product. The sales of products that have been on the market for less than three years show this strategy of repeated innovation.

This company is also an interesting case because its chemical and pharmaceutical branches were once merged. The businesses gradually became differentiated as the organization grew and created divisions. Finally, after a period of steady decentralization, there was a total split of the two businesses, which were spun off into two independent companies. This past allows us to link similarities and differences to the specific nature of the businesses and to the strategies implemented in the companies.

Our study was carried out with C. Midler and first focused on changes in project management which were going on within the group, particularly with respect to activities in the Chemicals and Health divisions. The material was compiled by one of three methods: a training program for project managers (access to some one hundred on-going projects within the company); a more in-depth analysis of some fifteen projects based on interviews with project teams; and, finally, a longitudinal approach following a project from inception through to its conclusion (2 years). In a second phase, the study was focused on the evolution of the organization of research departments in relation with competencies development: the reorganization of a research centre in the pharmaceutical branch going along with reorganization of the whole R & D department ; the historical process of development of key competencies that enabled the development of innovation in a specific line of business of the chemical branch.

We begin in analyzing and characterizing the pharmaceutical branch, the project management and the knowledge management processes. The chemical business and its methods of organizing development processes is then introduced. After having reviewed the main differences in internal organizational processes related two these different strrategies, the main issues an organization may face in trying to combine them is discussed.

III — The pharmaceutical branch: a prime example of a block strategy

What is an innovation project in this field ? Pharmaceutical innovation projects identify, develop and market new medications.

The regulatory agency that authorizes the marketing of medications requires projects to be organized into major phases, labelled : discovery, I, II and III. The discovery phase is restricted to animal testing. But many parameters have to be established already at this stage (the product injected, the final steps in the manufacturing processes) in order to get the authorization for human testing, the main objective of this phase. Phases I to III involve clinical trials in humans, only dosages and administration protocols may be revised during phase I.

The starting points of projects are the pathologies for which researchers are attempting to devise therapies and ways of acting on an illness which constitutes concepts. A concept is first expressed by a type of molecule and a hypothesis concerning its action on the illness. Specifying the concept in detail and designing tools for it leads researchers to draft a protocol that describes the molecule and the sought-after property, a production method, a method for verifying the efficacy hypothesis using an animal model and an explanation of the predictability of the animal test in humans.

III – 1 – Project management processes

Now that we have rapidly described the main steps of the development of an innovation in the pharmaceutical sector we shall characterize its project and knowledge management processes. Our analysis of the pharmaceutical business looks more specifically at the functioning of its vaccine research department.

Projects are structured to develop innovation as early as in the initial discovery phase. Right from the start, a mini-team is created that included experts in all the areas required to successfully complete the project (identification of the active ingredient, development of the manufacturing process, strategy for validating efficacy and non-toxicity). Until a recent reorganization, the project manager was the department's manager. But the departments were organized around therapeutic targets resulting in an almost perfect overlap between department scope and project scope. The department's manager combined scientific expertise in one discipline and in the therapeutic target, supervisory authority over team members and the status associated with his management responsibility—served as the project manager. He provided project monitoring and continuity. The change of organization of the research center led to a classic matrix structure , splitting up its hybrid research/project departments. To strengthen projects, the project manager was assigned to a more senior level in the hierarchy (reporting directly to the R&D manager of the branch) and involved also in the clinical development stage.

Contrary to our hypothesis set in part I, even in a sector such as the pharmaceutical industry, where scientific expertise and patents are key to the success of innovation, companies implement a heavyweight project management model. We qualify of "heavyweight" the project managers because of the power they had to steer the exploratory phase toward one or another type of active ingredient or efficacy hypothesis, to determine budget uses and to ask for budget revisions from his reporting units. The project teams include various competencies in product development, testing (efficacy, toxicity), process development and the preparation of approval requests.

The third characteristic chosen to specify project management methods is concurrent engineering, or “overlapping phases”. There was no line drawn between a highly exploratory research activity, during which creativity would be protected and fostered, and a later, separate phase in which development work would be well-defined and equipped with tools. However, a relatively sequential schedule was imposed by the approval authority. Researchers are not allowed to conduct efficacy tests in humans before all the non-toxicity tests are complete. In the same way, the production process must be established before efficacy tests can begin.

In the pharmaceutical field, the pharmaceutical group, health authority and physician agree on a method for certifying product efficacy. The decisive part of the probing process takes place during the discovery phase. An efficacy test featuring a model of the illness (selected strain of the virus, bacteria or diseased cells, for example) and a behavioural model of the human body (animal model, test on a particular type of cell) serves as the primary and only way to undertake the learn and probe process. Then tests are conducted on a stastically representative sample of human being but it is already for the purpose of validation of the efficacy of the compound and not typically learn and probe process. As a matter of fact it is very difficult to adjust iteratively the medication. For ethical reason, it should be optimized before administration to human being. Whether the client is the patient, the prescribing physician or the public health-care agency that will authorize the medication and negotiate the level of reimbursement, there is no direct association with the design process.

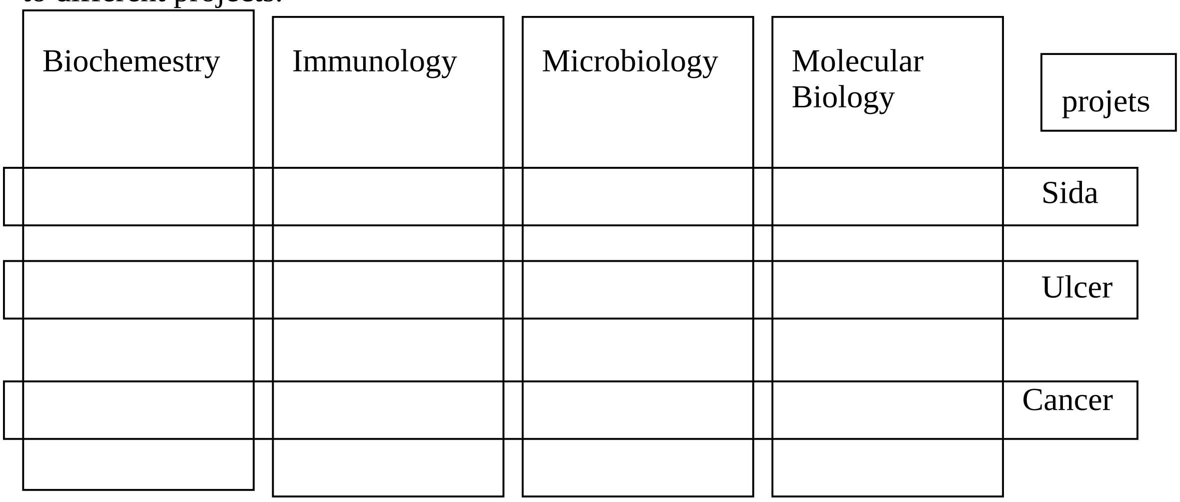
Pharmaceutical “inventions” are often the work of a network of people. One has only to think of diseases such as AIDS or cancer to understand how impossible it is to rely on a single player to identify a new medication or vaccine. On the opposite, they are the by-product of a combination of more in-depth understanding of the illness, the identification of a bacterial or viral strain that causes an illness in laboratory animals similar to the one in man and the discovery of a simple test that makes it possible to show the efficacy of a substance on a cellular process disrupted by disease. Advances on several different scientific fronts combine to show, at a given point in time, that a molecule has a specific efficacy in a test and overall efficacy on an illness or certain consequences thereof. Thus the current trend is a move toward forming various types of partnership: partnerships with university laboratories to explore basic topics unconnected with projects, but which cement the tie in the network; partnerships to pursue a specific topic, in which the university laboratory has special expertise; genome sequencing contracts; a partnership between pharmaceutical companies with two different approaches to the same illness; and so on. Most of these relationships are being developed in conjunction with carefully studied intellectual property strategies.

Characteristics	Block strategy exemplified by the pharmaceuticals branch	hypo
Project management methods		
Heavyweight project manager Multi-expertise team concurrent engineering	Yes	H4 No
Learn and probe process	No	
Development partnerships	Yes (with academic research center and pharmaceutical company) upstream partnership	H5 yes
Knowledge management routines		
Individual incentive	Limited	H6 yes
Collective learning processes	Yes	No

III – 2 –Knowledge management routines

The first knowledge management routine outlined in our literature review consists of formal, specific incentives tying individual compensation to the number of communications, publications and patents produced. In the case studied, there was no formal or systematic definition of individual goals or bonus specifically associated with a patent application. Involvement in outside scientific networks was informally (and positively) taken into account in individual researcher evaluations.

The main change we saw was the decision to introduce inter-project working group to promote cross-project learning. It occured when the research centre shifted to a matrix organization. Both evolutions strengthened the research centre’s emphasis on competency and grouped various experts with the same competency who were assigned to different projects.



Two types of formal processes were introduced. One was dedicated to the homogeneisation and optimization of methodologies developed while working on various projects. The other was “technological or exploratory projects”. They were aimed at the development of a new technology or the exploration of a phenomenon not well undersood identified in several projects. Formal process inspired by project management techniques were used: goals sheet, schedule, intermediate deadlines, budget, manager and team involved.

The important thing to stress about this cross-project team groups is that the collective nature of learning processes and competencies in an organization is taken into account. The emphasis is not placed only experts management but also on collective learning processes and settings, which have to be managed, focused, monitored...

The topics of the technological projects were also discussed collectively. The department head enjoys a great deal of room for initiative. But discussion with department experts, the other specialists and the project heads seemed important in choosing topics actually explored and support topics.

We could observe knowledge management mechanism both at individual level and at a collective level. Our hypothesis concerning knowledge managment is then partially validated because even in a very knowledge intensive sector such as drug discovery, the stress on collective learning seems important in research centers.

IV – The chemical branch: the turn toward a run strategy

The analysis of innovation in the pharmaceutical branch led us to characterize the implications on project management and knowledge management of a “block” strategy. What are these implications in the case of a business adopting a run strategy ?

In the chemical branch, innovation projects involve devising new chemical compounds with properties that are of particular interest regarding their applications. For instance, researchers may develop a new mastic silicone that enables workers to clean tools using water instead of a solvent, a new silica that adds resistance properties to tires while solving the tire recycling problems, a new, lead-free coloured pigment. Most involve well-known and identified families of molecules. However, one property of the family is reworked and optimized to tailor it for specific uses either by means of the molecule chosen, the way it is formed, the formula or some other method. Innovation consists of devising a more or less new chemical compound, produced using a more or less new process, and featuring an application property that past materials did not offer or offered in inferior form.

IV – 1 – Project management

During the study, the role of the project manager was strengthened. Now, overall project managers are responsible for exploring specific application properties that might be improved as well as the potential of technical avenues under consideration: these two processes take place concurrently. Project managers are dedicated to the project and responsible for the profit generated by the new product. They coordinate “upstream marketing” players, who concentrate on understanding the market and competing products as well as the properties that could differentiate potential innovations within the product line being studied. They also coordinate research personnel involved in developing the product and the process used to characterize it. They thus qualify as “heavyweight” project managers, even though their status within the company is not equivalent to that of a project director in the auto industry. Indeed, project managers are responsible for the project as a whole and not just a piece of it or the contribution of a particular occupation: they enjoy some leeway in targeting the project (market position, technical choices), and they oversee a project team with multiple competencies—product research, process research, marketing and industrialization.

The formal procedures for innovation projects was drafted and listed several phases. The firm devised the tools in order to spell out the prerequisites for moving from one phase into another; examples include tests that must be completed before committing to the heavier investment of financing pilot or industrial facilities. In practice, project managers used this standard project development plan as a reference for deciding when to carry out work concurrently, if it was needed given the specific requirements of the project and the deadlines, and to evaluate the risk of this overlapping.

The firm has stepped up the number of its partnerships with manufacturing customers. Its goal is to work out the desired application properties and the tests for measuring those properties with them in order to optimize the products under development. These relationships differ from traditional contracts to purchase raw materials in that they begin when the product is still in the development stage. The advantage for the customer is that it can guide the innovation process of its supplier, so as to end up with a compound especially well suited to its needs. The risk, however, is that the development process will not be successful. To combine competition among suppliers for the customer and access to more than one customer for the supplier, the profit-sharing formula incorporated into these partnerships consists of an exclusive, short-term contract for, say, one year. This again highlights the context of repeated innovations—to give a competitive advantage to a player, even if only for one year, is motivation enough to sign a certain number of partnership deals.

Partnerships with customers enabled a learn-and-probe-type iterative process. The second level at which learn and probe again became important is at the level of strategy itself. The repeated introduction of new products lead to a view in chemicals similar to the one existing in the software industry, i.e. in terms of successive generations. The company introduce a chemical compound knowing that the product still has a few “bugs”, but also offers qualities that set it apart from the competition and could help the first generation achieve significant market penetration. Its weaknesses will be improved during the development of a second generation.

As hypothesized, the heavyweight project management has been developed in the chemical branch to undertake the run strategy with its turn towards specialties. Both partnerships and learn and probe processes have been set up with customers in order to elaborate new products in response to to new or more focused needs as soon as identified.

IV – 2 – Knowledge management routines

Knowledge management studies often skip over the question of the nature of the competencies and knowledge to be developed or maintained and updated. In contrast, strategic studies discuss core competencies but do not delve into the organizational processes that support their development. Attempts to answer this question are inevitably highly controversial. However, using this kind of interpretive grid in an industrial case assumes that one can at least specify which competencies the firm considered worth developing to promote innovation before focusing on the procedures

introduced. Given the nature of chemical innovation projects, the key competencies identified were :
-skills in developing tools to measure the desired usage properties,
-competencies in relating the physicochemical parameters of compounds to the application properties
-skills in relating the functional parameters of a process to the physicochemical parameters of the compound.

The first step was to design structures: to add application laboratories to the organizational chart, to form applicability teams and to define “development and innovation manager” functions. The departments were created based on the development of specific skills related to the firm’s needs and not on existing competencies outside the company. This department could borrow on various existing theoretical databases from the disciplines to go on on specific types of problem

Thus, the application laboratories did not just evaluate or describe products: they developed tests able to assess usage properties quickly using small samples, and also gained an understanding of the mechanisms that conferred the usage properties, starting by linking physicochemical characteristics to the usage properties.

Although the strategic shift to specialty chemicals prompted a restructuring of research departments and a redefinition of expertise fields, there was no significant change in the management of individuals. There was no formal incentive tying the number of patents, publications and so on to bonuses. This type of incentive to encourage researchers to become involved in academic networks was not singled out as a priority, yet patents and intellectual property were a vital aspect notably in the partnerships with manufacturing customers.

Cross-project sharing of specific competencies acquired through different projectswas not organized per se. Scientific and technical mentors or senior experts were assigned to act as coaches to junior researchers and serve as a competencies resource. They were therefore in a good position to know about the specific problems and development work being done on different projects and to take part to cross-fertilization. However, projects were much shorter-lived in chemicals. As a result, the succession of projects and the assignment of staff to different projects also helped inter-project knowledge acquisition.

Finally, technology projects were set up to explore themes involving different products or processes. A three-year programme was usually drawn up, and a team combining relevant specialists, sometimes drafted across departmental lines, was established.

Characteristics	Run strategy exemplified by the specialty chemicals branch	hypo
Project management methods		
Heavyweight project manager Multi-expertise team Concurrent engineering	Yes	H1 yes
Learn and probe process	Yes	H2, yes
Development partnerships	Yes (with customers)	
Knowledge management routines		
Individual incentive	No	H3 no
Collective learning processes	No- positions of senior experts, successive generations of new products building on the competencies developed in past projects	H3 yes

V-Discussion

Our results are of three types: (1) wether the hypotheses were validated by our empirical analysis; (2) statements that can be drawn from our empirical analysis but about which no hypothesis could be developed from the literature; (3) the main differences in the internal organization of businesses adopting these two opposing strategies. Finally, we discuss the difficulties of adopting a “combined” strategy and specify the conditions that might reduce the conflict.

Hypotheses H1 and H2, about the run strategy, predicting the adoption of a heavyweight project management and “learn and probe” processes, are confirmed. The parallel hypotheses (H4, H5) for the block strategy are only partially confirmed. Development partnerships with the academic units were associated with the block strategy as expected. Contrary to our prediction, the block strategy evoked a project management style very similar to the heavyweight project management model.

The hypotheses concerning the knowledge management processes are not confirmed. In the run strategy, no organizational device specifically designed to enhance learning processes either at an individual level or at a collective level was implemented. In contrast, in the block strategy, knowledge management routines were observed at both the individual and collective level. The collective level even appeared to be the main focus of the line management at the time of the study. Different workshops were set up to facilitate knowledge exchanges between experts as well as between the technicians. In the run strategy, product development processes are short. As a consequence, experts assigned to a project quickly reinvest their knowledge on other projects and share it with other project team members. This pace and the regular recomposition of project team facilitate the exchange of knowledge. In contrast, in the pharmaceutical industry, development processes take often more than 8 years, teams are rather stable and dedicated to a project for several years. As a consequence, routines specifically aimed at facilitating collective learning were set up.

Two organizational consequences of the run strategy appeared to be very important in the case studied and were not adressed in the literature. The first consequence is the development of partnerships with customers. As predicted in our hypothesis, “learn and probe” processes were structured with customers during the development phase. In addition to this frequent contact with selected customers, development partnerships with customers were set up in order to develop generic knowledge linking some properties the customers were interested in with the intrinsec physical or chemical characteristics of the products. Development partnerships have been outlined in the litterature, but those analyzed were initiated by big companies to deal with their suppliers. Here, development partnerships with customers are a strong characteristic of a business with a run strategy.

A second element appeared important and relates to the knowledge management strategy of a business having a run strategy. As mentioned earlier, no specific organizational artifact dedicated to enhancing learning processes either at an individual level or at a collective one was identified. There was an emphasis on how departments were structured within the research function. Depending on the kind of expertise housed in a particular department, the knowledge shared between experts and the topics on which new knowledge was built varied. In the pharmaceuetical branch, experts having the same academic background and developing the same academic specialty were grouped even if they were working on very different molecules and therapies for very different diseases. The aim of such a grouping was to enhance the shared knowledge in relation to the evolution of the academic discipline. In contrast, in the chemical branch of the firm, the rationale for grouping experts in a department was not the academic discipline but the generic property of the product the researchers were working on: e.g. biodegradability, fluorescence, anti-foam. Within these departments, “technological projects” were also set up and specifically dedicated to developing new expertise. Technological projects were especially important in the run strategy, where the timing of development sometimes hindered the exploration of new technical options that might take too long to master.

The main differences between these two innovative strategies, as far as internal organization is concerned, appeared to be the following.

First, in the run strategy the customer was strongly associated with and almost a part of, the project team. In contrast, in the block strategy, a rather strict border existed between the development team and the customer.

The second main difference is related to the actor with which development partnerships were set up. In the run strategy, partnerships involved the customers themselves, will thus be called downstream partnerships. In the block strategy on the other hand, partnerships involved research centers and academic units to be called further upstream partnerships.

In light of this case and the issues that have been raised thus far, the concern for implementing a dual strategy—combining blocking and running—would be to simultaneously stipulate an upstream focus for the block strategy and a downstream one for the run strategy. On one hand, long-term projects, typical of the block strategy, elaborating on the company’s expertise and its upstream partnerships have to be set up. On the other, short-term projects involving customers in learn and probe processes and expanding down stream relationships are also to be structured. One issue is to differenciate these two kinds of projects. But establishing and maintaining relationships between experts involved in the two kinds of projects is also crucial for maintaining the efficiency of the design department. In order to deal with this dual strategy, this organization should evolve toward a specialization of experts in one or the other type of project. At the same time, the departments should group the experts according to their expertise whatever kind of project they are involved with.

Of course, there are limitations to our study. Our focus on one case and one industry raises the question of the generalizability of our conclusions. On the basis of this long-term and in-depth study some issues were raised that can be investigated on a larger scale: the role of downstream development partnerships in the run strategy in various industries ; a comparison of how departments are structured within the research function of firms in the same industry and how this “organizational design parameter relates to the development of specific expertises.

Another path worth to following would be to analyze the case of a company that has adopted a combined strategy. The semi-conductor industry is the first one think of, the cosmetics or the food industry are far less studied but could be a sector with some firms having such a dual strategy.

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